

REMARKS

By the present amendment, which accompanies the RCE, claims 62-69 have been canceled without prejudice or disclaimer of the subject matter thereof, thereby obviating the rejection of the claims under 35 U.S.C. 112 and 35 U.S.C. §103. New claims 70-77 have been presented, wherein claims 70 and 74 are independent claims directed to the plasma etching apparatus of the present invention and applicants submit that such claims, as presented, are in compliance with 35 U.S.C. 112, and patentably distinguish over the cited art, as will become clear from the following discussion.

With regard to the Examiner's rejection under 35 U.S.C. 112 with regard to the feature of a temperature controller not being supported in the specification, it is noted that the specification in the paragraph bridging pages 15 and 16 describes a heat exchanging medium is circulated and supplied into the jacket 103 from a heat exchanging supply means 104 so as to control the temperature of an inner surface of the side wall of the processing chamber formed by the jacket 103. Thus, it is apparent that a temperature controller is disclosed in the specification and, for example, a schematically illustrated box could be shown on the heat exchanging medium supply means 104 and labeled a temperature controller, if deemed necessary.

By the present amendment, new claims 70-77 have been presented, wherein each of independent claims 70 and 74 recite the feature of a sample being etched processed in the chamber in which the plasma is generated and thermally conductive medium which is circulated inside of the member or jacket forming a portion of a side wall of the chamber so as to control a temperature of a surface of the member or jacket to cool the surface of the member which contacts the plasma during the etching processing of the sample so that products generated in the chamber during the etching processing of the sample are deposited on the member or jacket. Applicants note that the present invention is directed to the problem of

prior art arrangements in which the temperature of the side wall surface of a chamber has a relatively high value which influences the etching rate and the reaction products which are deposited on the side wall resulting in etching of the wall surface and consumption thereof by plasma as well as the fact that such serves as a dust source within the plasma chamber as well as enabling peeling of the reaction products from the side wall, thereby adding contaminants to the plasma chamber as described in the Background of the Invention portion of the specification of the present invention. Based upon the study of the inventors of this application, as pointed out at page 7 of the specification, it has been determined that when the inner wall surface temperature in the reactor is controlled to a temperature sufficiently lower than that of the wafer being processed, a strong coating film is formed on the inner wall surface which film surface is not peeled off and damaged and dust is not caused. Moreover, applicants have determined by utilizing a replaceable or detachable jacket or member forming part of the side wall of the chamber, and controlling the temperature of the inner surface of the jacket or member forming the side wall by circulating a thermally conductive medium therein, a film formed of the reaction products in the chamber can be securely deposited on the side wall and the side wall can be replaced by exchanging the member or jacket to the outside and providing a new jacket or member in the chamber. More particularly, as pointed out at page 11, lines 4-14 of the specification, by controlling the temperature of the inner wall surface of the reactor to a constant temperature sufficiently lower than that of a wafer, the polymerization of the coating layer proceeds and a solid layer structure can be formed so that the inner wall surface will not be etched and consumed by plasma, such that the frequency of a part exchange of the inner wall surface can be reduced and the running cost can be decreased. That is, a cleaning operation for the side wall becomes substantially unnecessary. Moreover, even if the coating layer is exposed to plasma, peeling and damage are not caused to the surface thereof because the film composition is dense, so that dust will not be caused.

Applicants submit that such features are clearly set forth in new independent claims 70 and 74 and the dependent claims thereof and that such features have clear support in the specification and drawings of this application and that such features are not disclosed or taught in the cited art, as will become clear from the following discussion.

The rejection of rejected claims 62-69 under 35 U.S.C. §103(a) as being unpatentable over Tsuji et al (JP 4-214873) in view of Shinji (JP 9-275092) and Ishioka (JP 3-104222), such rejection is traversed insofar as it is applicable to the present claims, and reconsideration and withdrawal of the rejection are respectfully requested.

As to the requirements to support a rejection under 35 U.S.C. 103, reference is made to the decision of In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988), wherein the court pointed out that the PTO has the burden under §103 to establish a prima facie case of obviousness and can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. As noted by the court, whether a particular combination might be "obvious to try" is not a legitimate test of patentability and obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. As further noted by the court, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

Furthermore, such requirements have been clarified in the recent decision of In re Lee, 61 USPQ 2d 1430 (Fed. Cir. 2002) wherein the court in reversing an obviousness rejection indicated that deficiencies of the cited references cannot be remedied with conclusions about what is "basic knowledge" or "common knowledge". The court pointed out:

The Examiner's conclusory statements that "the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is immaterial to patentability, and could not be resolved on subjected belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher."... Thus, the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion. (emphasis added)

Turning to the disclosures of the cited art, irrespective of the Examiner's position, applicants note that Tsuji et al discloses a plasma processing CVD apparatus in which a cleaning operation is performed for removing by etching processing the reaction products deposited on the surface of the shield disposed in the processing chamber at a time different from plasma processing of a wafer or the like with the distribution of a magnetic field formed within the chamber during the cleaning operation being regulated and the surface temperature of the shield during the cleaning operation regulated in an appropriate manner by means of cooling and heating devices provided in the chamber so as to reduce the time required for completing the cleaning operation. As apparently recognized by the Examiner, there is no disclosure of the shield being detachable for removal to the outside. More particularly, a basic premise of the Tsuji et al reference is that there is no need to have a detachable shield, since a cleaning operation of the shield is performed in the chamber in the manner disclosed by Tsuji et al so as to remove the reaction products deposited on the shield in a reduced time period.

With respect to Shinji, this reference is directed to an etching processing apparatus in which a cylindrical wall protection member is exchangeably disposed along the inner side wall of the chamber with a spacing from the inner side wall of

the chamber, whereby if a polymer deposition film on the wall protection member grows to a certain thickness, the member is exchanged with a replacement cylindrical wall protection member. In accordance with the disclosure of Shinji, a thermally conductive gas is supplied in the space between the inner side wall of the chamber and the wall protection member so as to regulate the surface temperature of the latter.

As to the Ishioka, this reference discloses that reaction products deposited on a surface of a shield constituting an inner side wall of a double-structure wall arrangement is subjected to a plasma cleaning operation at a time different from plasma processing of a wafer or the like with the distribution of the magnetic field formed within the processing chamber being regulated in a manner similar to that disclosed by Tsuji et al, with a cooling medium being circulated inside the shield upon performing the plasma cleaning operation so as to cool the shield as well as to shorten the time required for completing the cleaning operation. It is noted that the cleaning operation is a separate and distinct operation from that of processing of an object within the chamber such as an etching process performed by the plasma on such object.

With regard to the suggested combination of Tsuji et al, Shinji and Ishioka, the Examiner recognizes that Tsuji et al does not expressly disclose that the member 20 is detachable, applicants submit that the reason for no disclosure in Tsuji et al for no disclosure of attachability of the member 20 is that there is no reason to detach the member 20 in Tsuji et al, since Tsuji et al is directed to performing a cleaning operation for such member 20 while the member is attached in the manner disclosed. The Examiner contends that Shinji discloses a plasma apparatus comprising a member 12 that is detachably attached to the chamber in order to easily removable, therefor reducing the cleaning time of the apparatus. That is, the protective wall member 12 in accordance with the disclosure of Shinji is apparently removed from the chamber 1 so as to facilitate the cleaning work and for this reason,

is attached exchangeably through a specified space along the end wall of the chamber. As described, plasma processing is stabilized by introducing cooling gas into the space, thereby suppressing the temperature rise at the surface of the protective wall member 12 caused by the heat generated within the chamber (see the abstract). Likewise, while Ishioka discloses a plasma apparatus comprising a removable shield 17 for enabling removing of the shield during maintenance and management of the system, including cleaning, for example, applicants submit that the Examiner's suggestion that it would be obvious in view of these disclosure to modify the apparatus of Tsuji et al to comprise a detachable member in such a way that maintenance and management of the apparatus is more easily performed and the cleaning time of the apparatus is reduced, is contrary to the disclosure of Tsuji et al, which provides for etching treatment while the member is within the CVD apparatus to remove the film deposited thereon. It is apparent that to remove such member from Tsuji et al, as suggested to be obvious by the Examiner, would require the member to be placed in a similar apparatus in order to undergo cleaning treatment for removal of the film deposited thereon by plasma etching thereof which would increase the cleaning time, and applicants submit that this position by the Examiner represents a hindsight reconstruction attempt in complete disregard of the teachings of the individual references. As is apparent from the decision of In re Fine, supra, "obvious to try" is not the standard of 35 U.S.C. §103 and there must be a disclosure in the reference to suggest the modification. Applicants submit that the Examiner's suggestion for modification of Tsuji et al is contrary to the disclosure thereof and this proposed combination of references is improper in the sense of 35 U.S.C. §103 and claims 70-77 patentably distinguish over this proposed combination in the sense of 35 U.S.C. §103 and should be considered allowable thereover.

Furthermore, there is disclosed in Shinji an arrangement in which a wall protection member on which a polymer film is generated and deposited during the etching operation is exchanged and described therein as an adverse effect on such

operation caused by the polymer deposition on the member. In order to minimize such effect, there is disclosed an arrangement of cooling the surface of the wall protection members so as to improve heat conduction between the detachable wall protection member and the reaction chamber. Thus, the cooling of the protection member surface is carried out by conducting heat applied to such member to the chamber so as to emit the same to the atmosphere. The surface temperature regulation of the protection member is premised on the arrangement in which such member is exchanged upon a certain deposition of a polymer products on the surface thereof and the side wall reaction chamber is of a double-structured arrangement which permits heat conduction between the adjoining walls to be improved. Thus, applicants submit that it is not proper to contend that the features of Shinji which are provided for improving heat conduction between the wall protection member and the side wall of the chamber should be applied to Tsuji et al, since in Shinji, the member is attachable from the side wall thereof which is contrary to the disclosure and teachings of Tsuji et al. Accordingly, applicants submit that this proposed combination of references is improper and all claims patentably distinguish over this proposed combination of references in the sense of 35 U.S.C. §103 and should be considered allowable thereover.

With regard to Tsuji et al and Ishioka, while this reference discloses an exchangeable shield member, it is apparent that the shield is disposed inside the reaction chamber with a certain interval from the top surface of the chamber and from the side wall thereof, respectively, which interval or spacing serves as a channel through which a processing gas is introduced into and discharge from the reaction chamber. Thus, Ishioka, like Shinji, specifically provides that the detachable member is not detachably held on an inner surface of a side wall of the vacuum vessel, which feature is also not disclosed by Tsuji et al, such that hereagain, the combination represents a hindsight reconstruction attempt in complete disregard of the disclosure and teachings of the individual references. Accordingly, all claims

patentably distinguish over this proposed combination of references in the sense of 35 U.S.C. §103 and should be considered allowable thereover.

In accordance with the present invention as recited in the independent claims and therewith the dependent claims, a processing gas is introduced into the processing chamber in which a sample is disposed while generating plasma within the chamber so as to perform etching processing of the sample and the generated plasma contacts the inner surface of the member or jacket through which a thermally conductive medium is circulated during the etching processing, the member or jacket being detachably held on an inner surface of a side wall of the vacuum vessel and forming an inner surface of the processing chamber which inner surface is in contact with the plasma. By controlling a temperature of the surface of the member or jacket to cool the surface of the member or jacket during the etching processing of the sample, the products generated in the chamber during the etching processing are deposited on the surface of the member which contacts the plasma and permits the generated products to be retained on the inner surface of the member or jacket and with the claim structure constrains the particles other reaction products and the processing gas and the like contained in the plasma from intervening between the detachable member or jacket and the vacuum vessel so as to stabilize the reproducibility and reliability of the sample surface processing operation within the processing chamber. Applicants submit that none of the cited art taken alone or in combination disclose the etching processing of the sample with a structure disclosed and operating in the manner set forth in independent claims 70 and 74 and the dependent claims thereof. As such, applicants submit that all claims patentably distinguish over the cited art in the sense of 35 U.S.C. §103 and should be considered allowable thereover.

With respect to the dependent claims, applicants note that the cited art does not disclose that a temperature of the surface of the member is controlled within a range of 20°C to 100°C during the etching processing of the sample nor that a

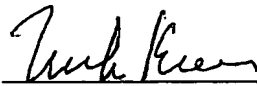
temperature of the surface of the member is controlled to be lower than a temperature of the sample during the etching processing of the sample. Moreover, there is no disclosure or teaching in the cited art when considered in conjunction with the structural arrangement of the parent claims that the thermally conductive material comprises the side wall of the vacuum vessel and the member or jacket.

Accordingly, applicants submit that all claims patentably distinguish over the cited art and should now be in condition for allowance.

In view of the above amendments and remarks, applicants submit that all claims present in this application should now be in condition for allowance, and issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.34403CV4) and please credit any excess fees to such deposit account.

Respectfully submitted,



Melvin Kraus
Registration No. 22,466
ANTONELLI, TERRY, STOUT & KRAUS, LLP

MK/cee
(703) 312-6600